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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Franz-Josef Stark

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EXAMINER

BAREFORD, KATHERINE A

ART UNIT

PAPER NUMBER

1792

NOTIFICATION DATE

DELIVERY MODE

04/14/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspatents@senniger.com

Office Action Summary	Application No. 10/678,601	Applicant(s) STARK ET AL.	
	Examiner Katherine A. Bareford	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 48,52,53,59,61 and 67-71 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 48,52,53,59,61 and 67-71 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) ☒ Notice of References Cited (PTO-892) | 4) ☐ Interview Summary (PTO-413) |
| 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) ☐ Information Disclosure Statement(s) (PTO/SB/08) | 5) ☐ Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) ☐ Other: _____ |

DETAILED ACTION

1. The amendment filed February 2, 2009 has been received and entered. With the entry of the amendment, claims 1-47, 49-51, 54-58, 60 and 62-66 have been canceled, and claims 48, 52, 53, 59, 61 and 67-71 (including new claims 70-71) are pending for examination.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 70 and 71 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In new claim 70, applicant has provided that "the nickel acetate yields 4-6 g/L nickel ions", "the complexing agent has a concentration of 25-70 g/L", and "the accelerator has a concentration of 1-25 g/L". However, the originally filed disclosure (specification pages 6-7, published application paragraphs [0023], [0027] and [0028]), provides that these amounts are the "starting concentrations" and "At the beginning of

the process"; not that these amounts are always present. Therefore, the scope of these claims is beyond what is supported by the disclosure as originally filed and the claims contain new matter.

In new claim 71, applicant has provided that "the complexing agent concentration is 30 to 65 g/L", and "the accelerator concentration is 2.5 to 22 g/L". However, the originally filed disclosure (specification page 7, published application paragraphs [0027] and [0028]), provides that these amounts are the "starting concentrations"; not that these amounts are always present. Therefore, the scope of these claims is beyond what is supported by the disclosure as originally filed and the claims contain new matter.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under

37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 48, 52, 53, 59, 61 and 68-71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harbulak et al (US 4483711) in view of Gulla et al (US 4152164) and Parker et al (US 3887732).

Harbulak teaches a method for electroless deposition of nickel layers. Column 2, lines 45-60. Deposition is from an electrolyte solution. Column 3, lines 1-10. The electrolyte can comprise a nickel metal base salt (such as nickel acetate, column 4, lines 30-40), a reducing agent (such as sodium hypophosphite, column 4, lines 35-45), an accelerator (the sulfonium betaine compound, column 2, lines 50-55 and column 3, lines 5-25), and a stabilizer (column 3, lines 40-50). The electrolyte further comprises a complexing agent. Column 4, line 50 through column 5, line 10. The complexing agent can be lactic acid (2-hydroxypropanoic acid). Column 5, lines 5-10. As to other optional materials, Harbulak provides that phosphorous, for example, can be deposited. Column 2, lines 55-60. The bath can be made up consisting essentially of these materials, as other materials do not have to be added. The resulting plating is a nickel-phosphorous layer on substrates. Column 2, lines 45-60 and column 7, lines 15-25. During electroless deposition the electrolyte can be buffered to a range of 4.3 to 5.2 using an alkaline

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buffering agent. Column 3, lines 35-40 and column 4, lines 10-30 (the Examiner understands that the plating bath can include buffering agents, as applicant claims a buffered electrolyte). The nickel base metal salt can be added such that nickel is provided in a range of 1 to 15 g/l. Column 4, lines 30-40. Deposition rate of the nickel can be at 0.50 mil/hr, for example (approx. 12.7 microns/hr). Column 9, lines 60-65. As to the throughput, Harbulak teaches that bath turnover amount can be more than 8 turnovers, and provides no upper limit on the amount of turnovers. Column 9, lines 30-65. As the amount of nickel can be 1 to 15 g/l and at least 8 turnovers can occur the amount of nickel throughput can be at least 8 to 120 g/l (or 8 times the original amount). Column 9, lines 30-65 and column 4, lines 30-40. As to the stabilizer, Harbulak teaches that the stabilizer can desirably be a metal salt of lead, tin, bismuth or zinc with an anion of acetate, for example. See column 6, lines 10-20. The amount of stabilizer used can be about 1- about 20 ppm (1-20 mg/L). Column 6, lines 15-25.

Claims 52-53: Harbulak teaches that during deposition makeup solutions of the constituents can be added to the bath to replenish the bath. Column 7, lines 5-15 and column 9, lines 35-50.

Claim 59: the reducing agent can be sodium hypophosphite. Column 4, lines 35-45.

Claim 61: the complexing agent concentration can be 15-200 g/l. column 4, lines 64-68.

Claims 68 and 69: During electroless deposition the electrolyte can be buffered to a range of 4.3 to 5.2 using an alkaline buffering agent. Column 3, lines 35-40 and column 4, lines 10-30.

Claims 70 and 71: The nickel base metal salt can be added such that nickel is provided in a range of 1 to 15 g/l, with 3-9 being preferred. Column 4, lines 30-40. The reducing agent concentration can be such that the hypophosphite ion concentration is 2-40 g/L. Column 4, lines 40-45. The complexing agent concentration can be 15-75 g/L. Column 4, lines 64-68. The accelerator concentration 1-200 micromol/L. Column 3, lines 30-35. The stabilizer concentration can be about 1- about 20 ppm (1-20 mg/L). Column 6, lines 20-25.

Harbulak teaches all the features of these claims except (1) the exact deposition rate of nickel using nickel acetate (claim 48), (2) the exact initial concentration of the nickel metal base salt in mol/liter and g/L (claim 48, 70), (3) the exact number of throughputs provided by the bath (claim 48), (4) the exact materials for the makeup solutions (claims 52, 53), (5) the exact amount of complexing agent used (claim 61, 70, 71), (6) the exact throughput in g/l (claim 48), (7) the self regulating bath pH (claim 48), (8) providing the nickel layer with internal compressive stress (claim 48) and in the claimed range (claims 68,69), (9) the exact amount of stabilizer used (claim 48, 71), (10) the exact amount of reducing agent, and accelerator used (claims 70, 71).

Gulla teaches that known electroless deposition baths include solvent such as water, metal ions, reducing agent such as hypophosphite, a pH adjustor, and a

complexing agent, and other minor additives. Column 1, lines 20-30. The deposition solution can include a nickel plating bath, where nickel ions are provided with a hypophosphite reducing agent, to provide a nickel-phosphorous alloy plating. Column 1, lines 30-50 and claim 3. Gulla teaches that conventional plating baths are no longer suitable for use within 3 to 10 plating cycles (or turnovers) due to build up of by-products, but that by following the process of Gulla the plating solution may be used indefinitely (no limit on the number of cycles) and plating quality will be uniform at any time during use of the solution. Column 4, lines 45-68. Gulla provides that the process comprises operation of the plating solution such that in each plating cycle, volume is maintained constant, a portion of the solution is continuously or periodically withdrawn and the solution is replenished, thus withdrawing by-products during each plating cycle to prevent intolerable buildup. Column 3, lines 35-50. For example, in one bath approximately 14 percent of the volume is withdrawn during each cycle with replenishers added to replace solution constituents. Column 4, lines 55-65.

Parker teaches that when electrolessly plating a metal substrate with a nickel-phosphorous plating, it is desirable to provide an internal compressive stress in the plating so as to improve the adhesion of the coating to the metal substrate. Column 1, lines 1-10, column 2, line 55 through column 3, lines 15. Parker further teaches that this stress can be controlled by varying the phosphorous content of the coating. Column 3, lines 5-15. The coating bath used in the examples can contain nickel ions, sodium hypophosphite, lactic acid, exaltants, stablizers, etc. and be buffered to a pH of 3.5 to 7.

Column 4, lines 20-60. Phosphorous amounts can be varied by adjusting the pH of the bath and the temperature of the bath. Column 6, lines 1-30. Compressive stress (negative stress) is desirably produced. See Table 1, column 8.

It is the Examiner's position that it is well known in the art of electroless plating to provide buffering agents in order to make a bath self regulating in pH. As applicant has not traversed this position from the June 22, 2007 Office Action, it is understood to be admitted prior art.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to (1) modify Harbulak to optimize the deposition rate when using nickel acetate by routine experimentation, which would result in deposition in the claimed range, as Harbulak teaches that deposition rates that can be in claimed range (Example 3) and that the deposition rate can be optimized by varying conditions of the plating (see Example 1). Since, as discussed in MPEP 2144.05, "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955), it would have been obvious to one of ordinary skill in the art to optimize the deposition rates, which are shown to be a result-effective variable by Harbulak. (2) It would further have been obvious to modify Harbulak to optimize the initial concentration of the nickel metal base salt by routine experimentation to give the desired amount of nickel initially provided in the bath, given that Harbulak teaches a range of desirable nickel ion amounts, and specific compound salts desirable to use

for the nickel metal base salt, and therefore the amount of nickel metal base salt would be a result effective variable proportional to the amount of nickel and, as discussed in MPEP 2144.05, "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). (4) It would further have been obvious to modify Harbulak to provide the same materials in the replenishing makeup solutions as in the original bath, which would include the reducing agent, accelerator, alkaline buffer, stabilizer and complexing agent, in order to provide a replenished bath that mimics the conditions of the originally bath, because Harbulak teaches to replenish the bath and all of these materials in the original bath. This would be true for the "first" and "second" makeup solutions since multiple replenishment would be needed for the multiple turnovers. (5) It would further have been obvious to modify Harbulak to optimize the exact amount of the complexing agent used in the plating solution by routine experimentation, which would result in g/L concentration of the complexing agent in the same range as claimed, because Harbulak teaches a range overlapping that claimed and "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)". (6) It would further have been obvious to modify Harbulak to optimize the throughput amount of the nickel in g/L used in the plating solution by routine experimentation, which would result in g/L nickel throughput in the same range as claimed, because

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Harbulak teaches amounts of nickel used that, when replenished as described, overlaps with that claimed (1-15 g/l x 8 replenishments, gives a range of 8-120 g/l), and "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)". (7) It would further have been obvious to modify Harbulak to buffer the solution to a self-regulating pH of between 4.3 and 5.2, for example, with an expectation of providing a desirably stable and easy to use bath for plating, because Harbulak teaches a nickel electroless plating bath with a desirable pH range of 4.3 to 5.2 (which is entirely within the range claimed by applicant) and to provide buffering agents in the bath and control it to a desired pH, and furthermore, it is well known that buffering agents are used to desirably make an electroless bath self regulating, and thus, do not need constant monitoring. (9) It would further have been obvious to modify Harbulak to optimize the exact amount of the initial stabilizer used in the plating solution by routine experimentation, which would result in mg/L concentration of the stabilizer in the same range as claimed, because Harbulak teaches a range overlapping that claimed and "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)". (10) It would further have been obvious to modify Harbulak to optimize the exact amount of the reducing agent and accelerator used in the plating solution by routine experimentation, which would result in g/L concentration of the reducing agent in the same range as claimed, because Harbulak teaches a range of

reducing agent overlapping that claimed and “In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In *re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)”, and teaches a range of accelerator used that would be converted to overlap that claimed, and “In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In *re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)”. (3) As to the exact number of throughputs provided by the bath, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Harbulak to optimize the amount of turnovers that can be provided as suggested by Gulla to provide a desirable reuse of the bath, as Harbulak teaches that more than 8 bath turnovers can be provided, and does not provide an upper limit, and Gulla teaches that a plating baths, including nickel-hypophosphite plating baths, can be controlled to have an indefinite number (no limit) of plating cycles or bath turnovers, by controlling removal of material and replenishment conditions; and therefore, since, as discussed in MPEP 2144.05, “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In *re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955), it would have been obvious to one of ordinary skill in the art to optimize the turnover amounts, for the specific plating process to be used. (8) It further would have been obvious to modify Harbulak in view of Gulla to control bath conditions to apply the nickel plating layer with internal compressive stress throughout

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the process as suggested by Parker in order to provide desirable increased adhesion to the substrate, as Harbulak in view of Gulla teach to provide nickel electroless plating with phosphorous, and Parker teaches that when providing nickel electroless plating with phosphorous, the plating can desirably be performed to provide compressive stress in the plating so that increased adhesion to the substrate is provided. As to the specific compressive stress of the nickel layer (of claims 68 and 69), Parker provides numerous examples of testing to provide what the stress would be under varied conditions (see Table 1, for example), and one of ordinary skill in the art would desire to determine the optimum range and conditions given the teaching of testing, since, as discussed in MPEP 2144.05, "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

7. Claim 67 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harbulak in view of Gulla and Parker as applied to claims 48, 52, 53, 59, 61 and 68-71 above, and further in view of GB 2 231 063 A (hereinafter '063).

Harbulak in view of Gulla and Parker teach all the features of this claim except the use of a sulfur containing heterocycle as the accelerator.

'063 teaches the desirable addition of sodium saccharin (also known as saccharine), as sulfur containing heterocycle, to electroless nickel plating baths to enable

nickel to be deposited through the bath life and to allow the deposited nickel phosphorous alloy to be subsequently blackened uniformly. Page 2, and pages 3-4.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Harbulak in view of Gulla and Parker to further add sodium saccharin to the plating bath as suggested by '063 for the benefits of allowing nickel to be deposited through the bath life and to allow the deposited nickel phosphorous alloy to be subsequently blackened uniformly, since Harbulak in view of Gulla and Parker provides an electroless nickel plating bath system to deposit nickel phosphorous coatings, and '063 teaches that the further addition of sodium saccharin to such baths provides the benefits of allowing nickel to be deposited through the bath life and to allow the deposited nickel phosphorous alloy to be subsequently blackened uniformly. While '063 does not specifically teach that the sodium saccharin acts as a further accelerator, since the same material is added to the bath as claimed (the sulfur containing heterocycle, described by applicant in the specification as being preferably sodium saccharine, see page 4 of the specification), it would be understood to act in the same way. The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

8. Claims 48, 52, 53, 59, 61 and 68-71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harbulak et al (US 4483711) in view of GB 1 243 134 (hereinafter '134) and Parker et al (US 3887732).

Harbulak teaches a method for electroless deposition of nickel layers. Column 2, lines 45-60. Deposition is from an electrolyte solution. Column 3, lines 1-10. The electrolyte can comprise a nickel metal base salt (such as nickel acetate, column 4, lines 30-40), a reducing agent (such as sodium hypophosphite, column 4, lines 35-45), an accelerator (the sulfonium betaine compound, column 2, lines 50-55 and column 3, lines 5-25), and a stabilizer (column 3, lines 40-50). The electrolyte further comprises a complexing agent. Column 4, line 50 through column 5, line 10. The complexing agent can be lactic acid (2-hydroxypropanoic acid). Column 5, lines 5-10. As to other optional materials, Harbulak provides that phosphorous, for example, can be deposited. Column 2, lines 55-60. The bath can be made up consisting essentially of these materials, as other materials do not have to be added. The resulting plating is a nickel-phosphorous layer on substrates. Column 2, lines 45-60 and column 7, lines 15-25. During electroless deposition the electrolyte can be buffered to a range of 4.3 to 5.2 using an alkaline buffering agent. Column 3, lines 35-40 and column 4, lines 10-30 (the Examiner understands that the plating bath can include buffering agents, as applicant claims a buffered electrolyte). The nickel base metal salt can be added such that nickel is provided in a range of 1 to 15 g/l. Column 4, lines 30-40. Deposition rate of the nickel can be at 0.50 mil/hr, for example (approx. 12.7 microns/hr). Column 9, lines 60-65. As

to the throughput, Harbulak teaches that bath turnover amount can be more than 8 turnovers, and provides no upper limit on the amount of turnovers. Column 9, lines 30-65. As the amount of nickel can be 1 to 15 g/l and at least 8 turnovers can occur the amount of nickel throughput can be at least 8 to 120 g/l (or 8 times the original amount). Column 9, lines 30-65 and column 4, lines 30-40. As to the stabilizer, Harbulak teaches that the stabilizer can desirably be a metal salt of lead, tin, bismuth or zinc with an anion of acetate, for example. See column 6, lines 10-20. The amount of stabilizer used can be about 1- about 20 ppm (1-20 mg/L). Column 6, lines 15-25.

Claims 52-53: Harbulak teaches that during deposition makeup solutions of the constituents can be added to the bath to replenish the bath. Column 7, lines 5-15 and column 9, lines 35-50.

Claim 59: the reducing agent can be sodium hypophosphite. Column 4, lines 35-45.

Claim 61: the complexing agent concentration can be 15-200 g/l. column 4, lines 64-68.

Claims 68 and 69: During electroless deposition the electrolyte can be buffered to a range of 4.3 to 5.2 using an alkaline buffering agent. Column 3, lines 35-40 and column 4, lines 10-30.

Claims 70 and 71: The nickel base metal salt can be added such that nickel is provided in a range of 1 to 15 g/l, with 3-9 being preferred. Column 4, lines 30-40. The reducing agent concentration can be such that the hypophosphite ion concentration is 2-

40 g/L. Column 4, lines 40-45. The complexing agent concentration can be 15-75 g/L. Column 4, lines 64-68. The accelerator concentration 1-200 micromol/L. Column 3, lines 30-35. The stabilizer concentration can be about 1- about 20 ppm (1-20 mg/L). Column 6, lines 20-25.

Harbulak teaches all the features of these claims except (1) the exact deposition rate of nickel using nickel acetate (claim 48), (2) the exact initial concentration of the nickel metal base salt in mol/liter and g/L (claim 48, 70), (3) the exact number of throughputs provided by the bath (claim 48), (4) the exact materials for the makeup solutions (claims 52, 53), (5) the exact amount of complexing agent used (claim 61, 70, 71), (6) the exact throughput in g/l (claim 48), (7) the self regulating bath pH (claim 48), (8) providing the nickel layer with internal compressive stress (claim 48) and in the claimed range (claims 68,69), (9) the exact amount of stabilizer used (claim 48, 71), (10) the exact amount of reducing agent, and accelerator used (claims 70, 71).

'134 teaches a method for electroless deposition of nickel layers. Page 2, lines 10-25. Deposition can be from an electrolyte solution comprising a nickel metal base salt, a reducing agent, a complexing agent, an accelerator and a stabilizer. Page 2, lines 25-65 and page 3, lines 50-60. '134 teaches that uniform metal layers can be deposited at a steady high deposition rate of 8.89 micrometer/hour, for example. Page 4, lines 30-36 and 85-90 (0.35 mil/hr = 8.89 micrometer/hour). The throughput can be 15-20 MTO, for example 15 MTO. Page 4, lines 35-40 and 100-105. '134 teaches that the nickel metal base salt of the electrolyte can be a nickel metal salt whose anions are volatile (nickel

acetate). Page 2, lines 90-95. The initial concentration of metal ions can be 0.119 mol/L, with the specification teaching providing maintaining the concentration at 0.0935 and 0.153 mol/L, preferably approx. 0.119 mol/L, for example. Page 2, lines 110-115 and page 4, lines 79-90. The pH of the bath is desirably fairly constant at 4.5 to 4.7. Page 2, lines 115-125. The complexing agent is described as a glutamic acid or its water soluble salts. Page 2, lines 25-40. While the claim refers to other "optionally" provided components, these are not required to be present. The metal salt can be nickel acetate. Page 2, lines 90-95. A makeup solution is added to the electrolyte while practicing the method. Page 3, lines 95-110. The makeup solution can include reducing agent and an alkaline buffered complexing agent. Page 3, lines 105-130 and page 4, lines 1-20. '134 also provides the use of accelerators in the bath. Page 2, lines 55-65. Makeup solutions will be needed to be added from time to time and thus first and second makeup solutions will be added. Page 3, lines 95-105. The reducing agent can be sodium hypophosphite. Page 2, lines 50-55. The concentration of complexing agent ions is at least twice that of the nickel ions, and the nickel ions can be at 0.079 to 0.189 mol/L (In example 1, 0.321 mol/L of complexing ions is provided by 60 g/L of monosodium glutamate monohydrate). Page 2, lines 60-70 and page 4, lines 75-75.

Parker teaches that when electrolessly plating a metal substrate with a nickel-phosphorous plating, it is desirable to provide an internal compressive stress in the plating so as to improve the adhesion of the coating to the metal substrate. Column 1, lines 1-10, column 2, line 55 through column 3, lines 15. Parker further teaches that this

stress can be controlled by varying the phosphorous content of the coating. Column 3, lines 5-15. The coating bath used in the examples can contain nickel ions, sodium hypophosphite, lactic acid, exaltants, stablizers, etc. and be buffered to a pH of 3.5 to 7. Column 4, lines 20-60. Phosphorous amounts can be varied by adjusting the pH of the bath and the temperature of the bath. Column 6, lines 1-30. Compressive stress (negative stress) is desirably produced. See Table 1, column 8.

It is the Examiner's position that it is well known in the art of electroless plating to provide buffering agents in order to make a bath self regulating in pH. As applicant has not traversed this position from the June 22, 2007 Office Action, it is understood to be admitted prior art.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to (1) modify Harbulak to optimize the deposition rate when using nickel acetate by routine experimentation, which would result in deposition in the claimed range, as Harbulak teaches that deposition rates that can be in claimed range (Example 3) and that the deposition rate can be optimized by varying conditions of the plating (see Example 1). Since, as discussed in MPEP 2144.05, "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955), it would have been obvious to one of ordinary skill in the art to optimize the deposition rates, which are shown to be a result-effective variable by Harbulak. (2) It would further have been obvious to modify Harbulak to optimize

the initial concentration of the nickel metal base salt by routine experimentation to give the desired amount of nickel initially provided in the bath, given that Harbulak teaches a range of desirable nickel ion amounts, and specific compound salts desirable to use for the nickel metal base salt, and therefore the amount of nickel metal base salt would be a result effective variable proportional to the amount of nickel and, as discussed in MPEP 2144.05, "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). (4) It would further have been obvious to modify Harbulak to provide the same materials in the replenishing makeup solutions as in the original bath, which would include the reducing agent, accelerator, alkaline buffer, stabilizer and complexing agent, in order to provide a replenished bath that mimics the conditions of the originally bath, because Harbulak teaches to replenish the bath and all of these materials in the original bath. This would be true for the "first" and "second" makeup solutions since multiple replenishment would be needed for the multiple turnovers. (5) It would further have been obvious to modify Harbulak to optimize the exact amount of the complexing agent used in the plating solution by routine experimentation, which would result in g/L concentration of the complexing agent in the same range as claimed, because Harbulak teaches a range overlapping that claimed and "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)". (6) It

would further have been obvious to modify Harbulak to optimize the throughput amount of the nickel in g/L used in the plating solution by routine experimentation, which would result in g/L nickel throughput in the same range as claimed, because Harbulak teaches amounts of nickel used that, when replenished as described, overlaps with that claimed (1-15 g/l x 8 replenishments, gives a range of 8-120 g/l), and “In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)”. (7) It would further have been obvious to modify Harbulak to buffer the solution to a self-regulating pH of between 4.3 and 5.2, for example, with an expectation of providing a desirably stable and easy to use bath for plating, because Harbulak teaches a nickel electroless plating bath with a desirable pH range of 4.3 to 5.2 (which is entirely within the range claimed by applicant) and to provide buffering agents in the bath and control it to a desired pH, and furthermore, it is well known that buffering agents are used to desirably make an electroless bath self regulating, and thus, do not need constant monitoring. (9) It would further have been obvious to modify Harbulak to optimize the exact amount of the initial stabilizer used in the plating solution by routine experimentation, which would result in mg/L concentration of the stabilizer in the same range as claimed, because Harbulak teaches a range overlapping that claimed and “In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)”. (10) It would further have been obvious to modify Harbulak to

optimize the exact amount of the reducing agent and accelerator used in the plating solution by routine experimentation, which would result in g/L concentration of the reducing agent in the same range as claimed, because Harbulak teaches a range of reducing agent overlapping that claimed and "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)", and teaches a range of accelerator used that would be converted to overlap that claimed, and "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)". (3) As to the exact number of throughputs provided by the bath, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Harbulak to optimize the amount of turnovers that can be provided as suggested by '134 to provide a desirable reuse of the bath, as Harbulak teaches that more than 8 bath turnovers can be provided, and does not provide an upper limit, and '134 teaches that a desirable range of metal turnovers when plating nickel with an electroless bath that includes a nickel metal base salt, reducing agent, complexing agent, accelerator and stabilizer is 15-20 times and therefore, since, as discussed in MPEP 2144.05, "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955), it would have been obvious to one of ordinary skill in the art to optimize the turnover

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amounts, which are shown to be a result-effective variable by Harbulak and '134. While '134 teaches the addition of glutamic acid complexing agent, Harbulak provides that multiple complexing agents can be used (column 4, lines 50-55) and thus further glutamic acid complexing agents can be added to the solution of Harbulak. (8) It further would have been obvious to modify Harbulak in view of '134 to control bath conditions to apply the nickel plating layer with internal compressive stress throughout as suggested by Parker in order to provide desirable increased adhesion to the substrate, as Harbulak in view of '134 teach to provide nickel electroless plating with phosphorous, and Parker teaches that when providing nickel electroless plating with phosphorous, the plating can desirably be performed to provide compressive stress in the plating so that increased adhesion to the substrate is provided. As to the specific compressive stress of the nickel layer (of claims 68 and 69), Parker provides numerous examples of testing to provide what the stress would be under varied conditions (see Table 1, for example), and one of ordinary skill in the art would desire to determine the optimum range and conditions given the teaching of testing, since, as discussed in MPEP 2144.05, "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

9. Claim 67 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harbulak in view of '134 and Parker as applied to claims 48, 52, 53, 59, 61 and 68-71 above, and further in view of GB 2 231 063 A (hereinafter '063).

Harbulak in view of '134 and Parker teach all the features of this claim except the use of a sulfur containing heterocycle as the accelerator.

'063 teaches the desirable addition of sodium saccharin (also known as saccharine), as sulfur containing heterocycle, to electroless nickel plating baths to enable nickel to be deposited through the bath life and to allow the deposited nickel phosphorous alloy to be subsequently blackened uniformly. Page 2, and pages 3-4.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Harbulak in view of '134 and Parker to further add sodium saccharin to the plating bath as suggested by '063 for the benefits of allowing nickel to be deposited through the bath life and to allow the deposited nickel phosphorous alloy to be subsequently blackened uniformly, since Harbulak in view of '134 and Parker provides an electroless nickel plating bath system to deposit nickel phosphorous coatings, and '063 teaches that the further addition of sodium saccharin to such baths provides the benefits of allowing nickel to be deposited through the bath life and to allow the deposited nickel phosphorous alloy to be subsequently blackened uniformly. While '063 does not specifically teach that the sodium saccharin acts as a further accelerator, since the same material is added to the bath as claimed (the sulfur containing heterocycle, described by applicant in the specification as being preferably

sodium saccharine, see page 4 of the specification), it would be understood to act in the same way. The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

10. The GB 2 231 063 A reference was provided with applicant's IDS statement of March 27, 2008.

Response to Arguments

11. Applicant's arguments filed February 2, 2009 have been fully considered but they are not persuasive.

(A) the Examiner first notes the new rejection of the claims provided by Harbulak, Gulla and Parker as discussed in the rejection above. This new use of Gulla is provided due to issues raised by applicant's new use of the term "consisting essentially of" as to the plating electrolyte; with Gulla providing the suggestion of an indefinite amount of turnovers to a bath that does not have further additions to what is described by Harbulak.

(B) The Examiner further notes that the rejection using Harbulak, '134 and Parker is maintained based on other possible readings of the term "consisting essentially of". While applicant argues that Harbulak does not show more than 8.1 turnovers, Harbulak

does provide the exact teaching that “The bath was periodically replenished to maintain the nickel and hypophosphite ion concentration substantially constant for more than 8 bath turnovers.” (column 9, lines 40-45). ‘134 shows 15-20 turnovers from using its bath, showing the obvious desire to optimize the amount of turnovers to be higher, within the ‘134 range. While ‘134 indicates that this is due to the addition of the glutamic acid, the Examiner notes that Harbulak teaches that mixtures of complexing agents can be used (column 4, lines 50-55), and does not limit the specific complexing agents that can be used, indicating that further complexing agents can be provided with the listed complexing agents of Harbulak – and ‘134 indicates such a complexing agent that would desirably be added as part of the optimization to increase the amount of turnovers. While applicant has claimed the solution materials as “consisting essentially of” the listed ingredients, including the specifically named complexing agents; MPEP 2111.03 indicates that as to the scope of the term “consisting essentially of”, “limits the scope of a claim to the specified materials or steps “and those that do not materially affect the basic and novel characteristic(s)” of the claimed invention. In re Herz, 537 F.2d 549, 551-52, 190 USPQ 461, 463 (CCPA 1976) (emphasis in original).” Furthermore, MPEP 2111.03 goes on to say that “For the purposes of searching for and applying prior art under 35 U.S.C. 102 and 103, absent a clear indication in the specification or claims of what the basic and novel characteristics actually are, “consisting essentially of” will be construed as equivalent to “comprising.” See, e.g., PPG, 156 F.3d at 1355, 48 USPQ2d at 1355 (“PPG could have defined the scope of the phrase consisting essentially of’ for

purposes of its patent by making clear in its specification what it regarded as constituting a material change in the basic and novel characteristics of the invention.”)” and “If an applicant contends that additional steps or materials in the prior art are excluded by the recitation of “consisting essentially of,” applicant has the burden of showing that the introduction of additional steps or components would materially change the characteristics of applicant’s invention. In re De Lajarte, 337 F.2d 870, 143 USPQ 256 (CCPA 1964).” Here, applicant has not provided such a showing, and therefore, “consisting essentially of” is construed as equivalent to “comprising.”

As to the internal compressive stress, Parker teaches how to achieve internal compressive stress from a nickel-phosphorous plating bath under conditions that overlap with Harbulak in view of ‘134 (column 1, lines 30-65 of Parker), and thus would apply to the bath of Harbulak in view ‘134. The present claims do not prevent the control of P content and thickness as described by applicant. The other features of the bath are suggested by the combination of Harbulak and ‘134.

As to the other optimized features of Harbulak – deposition rate, nickel concentration, pH, applicant has not indicated why it would not have been obvious to optimize from the teachings and ranges of Harbulak.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Katherine A. Bareford/
Primary Examiner, Art Unit 1792